

# *Central Indiana*

## *Fall 2016 Summary*

As we begin the month of December, we mark the conclusion of meteorological fall and welcome meteorological winter. Temperatures remained above average throughout much of the fall, producing one of the warmest falls on record. Overall, the fall of 2016 saw average temperatures above normal by 3 to 6 degrees. Most of central Indiana ended up with a drier than normal fall, generally running 1 to 2 inches below normal for the season. This was largely due to a dry October and November that saw only sporadic precipitation fall until the second half of November. Most of central Indiana experienced their first flurries in late November with some locations from Kokomo to Muncie and Winchester seeing a brief coating of snow.

The following is a summary of weather conditions experienced in Central Indiana during the months of September, October, and November 2016.

### *Temperatures*

The fall of 2016 was the **2<sup>nd</sup> warmest fall ever at Indianapolis** with an average temperature of 60.0°. This is 4.8° above the normal fall average temperature of 55.2°. Only the fall of 1931 was warmer with an average temperature of 61.3°.

### *September*

The warm and humid weather frequent through August continued into September. After a brief drop back into the 70s to start the month, temperatures rose back into the upper 80s and lower 90s from Labor Day through the 7<sup>th</sup>, which was the warmest day of the month for most of central Indiana. The passage of a front on the 9<sup>th</sup> brought a cooldown to more seasonable temperatures through the middle of the month as highs ranged from the mid 70s to lower 80s and lows fell back into the 50s. For Indianapolis, the morning of the 11<sup>th</sup> brought the coolest temperature since early July when the low fell to 55.

Beginning on the 16<sup>th</sup>, most of central Indiana experienced an extended stretch of very warm temperatures that lasted into the final weekend of the month. High temperatures were consistently in the middle and upper 80s most days through the 25<sup>th</sup> with even a few spots warming into the lower 90s from the 21<sup>st</sup> through the 23<sup>rd</sup>. A strong cold front tracked through the region late on the 25<sup>th</sup>, ushering in a much cooler and less humid airmass into the Ohio Valley. After two pleasant days in the 70s on the 26<sup>th</sup> and 27<sup>th</sup>, a

cutoff upper level low drifted into the area and brought showery, damp and cool weather to wrap up the month as highs remained in the 60s.

Most locations in central Indiana finished up September 3 to 6 degrees above normal. For Indianapolis, September 2016 was the warmest September since 2007.

## **October**

The warm fall season continued into October for central Indiana and the Ohio Valley as most of the region enjoyed their warmest October since 2007 with temperatures generally averaging 5 to 8 degrees above normal. An increasingly stronger Pacific jet stream helped to maintain near zonal flow over much of the contiguous United States for most of the month with periodic upper level ridges impacting the Midwest and Ohio Valley.

Highs rose during the first week of the month into the mid and upper 70s before peaking in the mid 80s on the 6<sup>th</sup> and 7<sup>th</sup> as the area resided under high pressure. After a brief cooldown to near normal levels over the Columbus Day weekend, temperatures returned into the mid and upper 70s from the 10<sup>th</sup> through the 12<sup>th</sup>. The passage of another cold front once again enabled highs to fall back into the 60s for a couple days before warmth returned for a five day stretch from the 15<sup>th</sup> through the 19<sup>th</sup>. Most locations had high temperatures peak again in the lower 80s during this time period

A cold front that brought the heaviest rainfall for most of the area for the entire month passed late on the 19<sup>th</sup> and early on the 20<sup>th</sup>, with the coolest daytime highs of October in the 50s in the few days that followed. It was during this period that most of central Indiana saw the coldest overnight lows, with widespread 30s on the morning of the 22<sup>nd</sup>. This ended up being one of only two or three mornings sufficient for patchy frost formation over parts of the region. Temperatures then remained generally near to slightly above normal for most of the rest of the month.

## **November**

November began unseasonably warm with highs in the upper 70s and lower 80s on the 1<sup>st</sup> and 2<sup>nd</sup>. The high of 79 in Indianapolis on the 1<sup>st</sup> was only the 3<sup>rd</sup> day in recorded history with a temperature of 79 or warmer in November. Temperatures cooled slightly with the passage of a cold front late on the 2<sup>nd</sup>, but remained above normal through most of the first week of the month with highs in the 60s and lows largely in the 40s.

The passage of another front brought another drop in temperatures beginning on the 8<sup>th</sup> and continuing into the middle of the month. Temperatures fell closer to near seasonable levels but remained slightly above normal overall with highs in the 50s. With mainly dry weather and light winds at night, central Indiana finally experienced widespread frost and the first hard freeze of the season with lows falling into the middle 20s in most areas on the mornings of the 12<sup>th</sup> and 13<sup>th</sup>. Yet another surge of late

season warmth commenced on the 15<sup>th</sup> and continued through the 18<sup>th</sup> with highs peaking in the mid and upper 70s on the 17<sup>th</sup> and 18<sup>th</sup>. The high of 75 in Indianapolis on the 18<sup>th</sup> marked the warmest temperature so late in the year since the high of 75 on November 20, 1942.

The passage of a strong cold front on the evening of the 18<sup>th</sup> brought an abrupt end to the unseasonably warm weather, with the coldest weather of the month for the following several days through much of Thanksgiving week. Highs remained below 50 degrees for most areas through the 26<sup>th</sup>, with even some areas holding in the upper 30s on a few of the days. Lows fell into the lower and mid 20s for several mornings. A return to southerly flow brought milder temperatures for the last few days of the month, highlighted by highs in the lower 60s across much of central Indiana on the 29<sup>th</sup>.

## ***Temperature Data for Other Sites in Central Indiana***

<b>Site</b>	<b>Fall 2016 Temperature</b>	<b>Normal Temperature</b>	<b>Diff. From Normal</b>
Indianapolis Int'l Arpt	60.0°	55.2°	<b>+4.8°</b>
Lafayette	57.7°	54.4°	<b>+3.3°</b>
Muncie	59.8°	54.4°	<b>+5.4°</b>
Terre Haute	59.4°	53.9°	<b>+5.5°</b>
Bloomington	60.0°	54.7°	<b>+5.3°</b>
Shelbyville	60.5°	54.5°	<b>+6.0°</b>
Indianapolis – Eagle Creek	60.1°	55.3°	<b>+4.8°</b>

## ***Fall Extremes Across Central Indiana***

<b>Site</b>	<b>Warmest Temperature</b>	<b>Coldest Temperature</b>
Indianapolis Int'l Airport	90 on 9/7	23 on 11/21
Lafayette	91 on 9/7	19 on 11/21
Muncie	90 on 9/7 and 9/23	25 on 11/12 and 11/22
Terre Haute	91 on 9/6 and 9/7	20 on 11/21
Bloomington	89 on 9/5 and 9/7	21 on 11/21
Shelbyville	91 on 9/21 and 9/22	24 on 11/21

Indianapolis-Eagle Creek	90 on 9/7	26 on 11/20
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## *Precipitation*

Overall this was tied for the **58<sup>th</sup> wettest fall on record at Indianapolis**. The total rainfall for Indianapolis this fall was 9.40 inches. This was 0.54 inches below the normal fall rainfall total of 9.94 inches.

### *September*

September rainfall ranged from below normal to much above normal. The driest areas were extreme northern and extreme southern Indiana and the wettest was southeast Indiana. Rainfall in central Indiana ranged from slightly below to above normal. Monthly totals measured from around an inch and a half in Gibson County in southwest Indiana to more than 8 inches in Franklin County in southeast Indiana. Most of the state received between 2 and 5 inches of rain during the month.

Precipitation frequency decreased in Indiana during September. Much of the state received little rainfall from the 1<sup>st</sup> through the 7<sup>th</sup> and from the 11<sup>th</sup> through the 15<sup>th</sup>. Indiana remained virtually rain-free from the 18<sup>th</sup> through the 24<sup>th</sup>. Rainfall of 2 inches or more occurred from the 8<sup>th</sup> through the 10<sup>th</sup>, the 16<sup>th</sup> through the 17<sup>th</sup>, the 26<sup>th</sup> and from the 28<sup>th</sup> through the 30<sup>th</sup>. The biggest event was from the 8<sup>th</sup> through the 10<sup>th</sup> when in less than 3 days a small portion of southeast Indiana received more than 6 inches of rainfall.

Rains on the 8<sup>th</sup> caused flash flooding in southeast Indiana followed by lowland flooding of the East Fork White River in Jackson County. The rains on the 17<sup>th</sup> brought the Eel and White Rivers in west central and southwest Indiana to bankfull levels. Lowland flooding along the East Fork White River in Jackson County lasted less than 2 days.

The cool, weather pattern at the end of the month helped alleviate abnormally dry areas of northeast and southern Indiana. Stream levels remained above normal as September ended.

### *October*

October rainfall was below normal to normal for much of Indiana. Above normal rainfall was generally confined to northwest and the northern portions of southwest and south central Indiana. The driest spot was near the Ohio River in Warrick County where only one-tenth of an inch fell and the wettest locations were in Lake County where nearly 5.5 inches fell. Much of central Indiana received 2 to 4 inches.

The largest rain event of October occurred from the evening of the 19<sup>th</sup> through the morning of the 21<sup>st</sup>. Rainfall of 1 to 5 inches fell in much central and southern Indiana. The heaviest rainfall of 3 to 5 inches fell in portions of west-central and southern Indiana, along and north of U.S. Highway 50 and south of Interstate 70. This rain ended the driest start to October in 63 years for south central Indiana near Louisville. Measurable rainfall during October fell in this area only on the 20<sup>th</sup> and 21<sup>st</sup>. Rainfall of one-half inch or more fell primarily in northern Indiana on the 1<sup>st</sup>, 12<sup>th</sup>, 16<sup>th</sup>, 26<sup>th</sup>-27<sup>th</sup> and the 30<sup>th</sup>.

The heavy rains of the 19<sup>th</sup> and 20<sup>th</sup> caused the Eel River in west central Indiana and the White River from Worthington to Edwardsport in southwest Indiana to approach flood stage. Elevated stream levels followed in the White River in east central, central and far southwest Indiana and in the East Fork White River in southern Indiana.

The dry start to October caused abnormally dry conditions to develop in southern Indiana by the 18<sup>th</sup>. The area south of U.S. Highway 50 missed by the significant rains of the 19<sup>th</sup> and 20<sup>th</sup> remained abnormally dry into November. Stream flow remained at or above normal for much of Indiana at the end of October.

## **November**

November rainfall was near normal to below normal for almost all of Indiana. Only a few locations in northern and west central Indiana received above normal precipitation during the month. The driest locations were in east central and southeast Indiana near the Ohio State border where several areas received less than 1.50 inches for the month. The wettest areas were in northwest Indiana where more than 5 inches fell in Porter County. Much of central Indiana received 2 to 4 inches.

Most of the rainfall during November fell on three days...the 18<sup>th</sup>, the 23<sup>rd</sup> and the 28<sup>th</sup>. Precipitation totaled 1 to 4 inches from the 18<sup>th</sup> through the 28<sup>th</sup>. Prior to the 18<sup>th</sup>, much of the state received less than one-half inch of rain. The largest rain event of the month occurred on the evening of the 2<sup>nd</sup> when storms dropped 2 to 4 inches of rain in isolated areas of northern Indiana.

Abnormally dry conditions that began in southern Indiana during October expanded in November. Abnormally dry to severe drought conditions developed by the 22<sup>nd</sup> in more than half of the state because of little rainfall. The driest area was in southern Indiana where moderate to severe drought conditions prevailed. Rainfall on the 23<sup>rd</sup> and 28<sup>th</sup> brought some relief to the drought conditions in the state.

No river flooding occurred in central and southern Indiana during November. Stream flow at the end of the month was normal to above normal in central and northern Indiana and below normal in small watersheds of southern Indiana.

## ***Rainfall Data for Other Sites in Central Indiana***

<b>Site</b>	<b>Fall 2016 Rainfall</b>	<b>Normal Rainfall</b>	<b>Diff. From Normal</b>
Indianapolis Int'l Arpt.	9.40"	9.94"	-0.54"
Lafayette	6.97"	8.52"	-1.55"
Muncie	9.53"	10.83"	-1.30"
Terre Haute	7.32"	9.33"	-2.01"
Bloomington	11.88"	10.82"	+1.06"
Shelbyville	8.16"	10.01"	-1.85"
Indianapolis – Eagle Creek	10.03"	9.06"	+0.97"

### ***Major Weather Events***

While it was a wet and at times stormy September for most, there was very little severe weather across central Indiana throughout the month. Strong thunderstorms accompanied a cold front during the evening of the 9<sup>th</sup> with gusty winds. There were reports of wind damage and power outages caused by storms moving through the Indianapolis metro area on September 16<sup>th</sup>. Scattered storms associated with an upper level low produced small hail and cold air funnels on September 28<sup>th</sup>. Heavy rain and flooding from slow moving thunderstorms impacted southern portions of central Indiana on the evening of September 8<sup>th</sup>, including multiple water rescues and closing Interstate 74 for a period of time in eastern Decatur County.

October was a relatively quiet month for severe weather. The only exception was during the afternoon and evening of October 19<sup>th</sup> as scattered severe thunderstorms developed across southern portions of central Indiana. Storms produced large hail and wind damage from near Sullivan and Vincennes east through Bedford and Seymour. A microburst caused barn damage and downed numerous trees in a small area a few miles east of Bedford in Lawrence County.

The only severe weather event in November occurred during the late afternoon and evening of November 18<sup>th</sup> as lines of thunderstorms developed along and ahead of a strong cold front. The storms produced wind damage and gusts up to 60 mph across much of the western half of central Indiana.

For information on severe weather in other areas throughout the fall, visit the Storm Prediction Center "Severe Weather Event Summaries" website at <http://www.spc.noaa.gov/climo/online/>.

### ***Winter 2016-2017 Outlook for Central Indiana***

The official outlook for the 2016-17 winter season (December-February) from the Climate Prediction Center, indicates greater chances for near to slightly below normal temperatures across central Indiana. At Indianapolis, the average temperature for the winter season is 30.5°. The outlook also calls for a greater chance of above normal precipitation. The average precipitation is 8.15" with 22.0" of snowfall.

***Data prepared by the NWS Indianapolis Climate Team***

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